STANDARDS DEVELOPMENT BRANCH OMOE
3 6936 00000 2494

Fumigation Procedure for Greenhouses and Mushroom Houses with Calcium Cyanide

Ontario

Ministry of the Environment

Hon. J.A.C. Auld
Minister

Everett Biggs
Deputy Minister

SB
955
.O57
MOE

DATE DUE

SB
955
.057

[illegible]
[illegible]
[illegible]

4/83

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact Service Ontario Publications at copyright@ontario.ca

FUMIGATION PROCEDURE
FOR
GREENHOUSES AND MUSHROOM HOUSES
WITH
CALCIUM CYANIDE

PESTICIDES CONTROL SERVICE

MINISTRY OF THE ENVIRONMENT

CALCIUM CYANIDE

Chemical Name	$Ca(CN)_2$
Molecular Weight	92.1
Generic Name	Calcium cyanide, Hydrogen cyanide.
Physical Properties	A grey granular powder or a fine dust.
Chemical Properties	Decomposed by moisture to give calcium hydroxide and hydrocyanic acid, a decomposition proceeding at humidities as low as 25% RH.
Toxicity	Calcium cyanide - acute; mice : 0.005 mg/kg dogs : 4 mg/kg rabbits : 4 mg/kg rats : 10 - 15 mg/kg.

(Toxicity information supplied by Dr. G. S. Cooper, Cyanamid of Canada Limited, Rexdale, Ontario).

FUMIGATION OF GREENHOUSES AND MUSHROOM HOUSES WITH CYANOGAS (CALCIUM CYANIDE)

Calcium cyanide is sometime used by greenhouse operators for the control of whitefly where the infestation has reached the proportion that ordinary control measures will not suffice.

Calcium cyanide is a compound of cyanide which when it comes into contact with moisture in the air or water releases deadly hydrocyanic acid gas. In order to use hydrocyanic acid gas or a cyanide compound for extermination in Ontario a person must be licensed under the Pesticides Act and Regulations.

In using cyanogas in a greenhouse certain procedures are dictated by the regulations under the Pesticides Act and by a common sense approach to the handling of a toxic substance like hydrocyanic gas. Any deviation from these procedures can lead to a serious accident. Hydrocyanic acid gas is such that most accidents are fatal.

Equipment Necessary

(1) Rubber gloves, coveralls that fit tightly around the wrists and ankles (this may be effected by using rubber bands on ordinary coveralls).

(2) A gas mask with a canister approved by the U.S. Bureau of Mines for use with HCN. An industrial facepiece should be used (a war surplus facepiece is not recommended). Do not use the same canister for HCN that you use for methyl bromide unless it has been checked by your supplier as approved for both.

(3) Signs 14" x 10" bearing the word danger 2½ inches high in red on a white background and saying that an extermination is taking place inside.

(4) Locks for all doors of the greenhouse.

(5) Methyl orange litmus paper.

(6) First aid kit with amyl nitrite pearls.

Procedure

(1) Before commencing an extermination with cyanogas in a greenhouse or a mushroom house, a permit must be obtained from the Director (this may be obtained from the nearest office of the Pesticides Control Section) and notify the local fire and police department that you have obtained the permit.

(2) Prior to commencing the fumigations, close and lock all doors except one, close all windows and ventilators. Extinguish all fires and electric lights.

(3) Remove any tropical fish tanks before fumigating.

(4) Put on the coveralls with the restricted cuffs and ankles, gas mask, hat and rubber gloves. Check that the facepiece is fitting properly.

(5) Make sure that greenhouse or mushroom house is clear of all humans or animals.

(6) Leave an assistant at the door where he can observe you at all times. Start the furthest from the open door and work towards it releasing the cyanogas dust or granules on the ground in the corridor. Do not re-enter an area that has been treated.

(7) Leave at the open door and lock it from the outside.

(8) Place the signs on all doors.

(9) If the exposure period is going to entail some hours of darkness, make provision for the signs to be illuminated during the hours of darkness.

(10) Ensure that some one is on the premises and close by during the entire period the gas is in the house.

Airing Out

(1) With gas mask in place, open doors and ventilators and then leave the house to air out.

(2) After an hour of airing out test with methyl orange litmus paper.

(3) If the presence of gas is indicated in pockets in the atmosphere, further airing out or the use of a fan to get better circulation should be implemented.

(4) If gas is present on cold surfaces the house should be closed up and reheated to over 70°F. and then airing out started over again.

(5) Remember it is law that no person other than a fireman, a policeman, the exterminator or his assistant shall enter a building that is under fumigation until the tests with methyl orange litmus paper shows that no gas is present and until the building has been aired out for 12 hours.

(6) Perforate and bury empty containers that were used to hold cyano gas.

(7) If any toilets are in the house, flush. Empty any water containers and refill with fresh water.

Gas Mask

This is your own personal protection. Keep it in good condition and in a cool dry place. The life of the canister depends on the length of time it is used and the concentration to which it is subjected. An accurate record of the length of time the canister is used should be kept and, when one hour has accumulated the canister be replaced. When not in use keep the canister sealed.

Methyl Orange Litmus Paper

These may be obtained from your supplier of cyanogas. They must not be allowed to dry out. In using them they should be placed on outside walls, damp areas or in areas difficult to aerate. If after two minutes the litmus paper does not change to a pink or red colour the area may be considered free from hydrocyanic acid gas.

Storage of Cyanogas

Tins of cyanogas must be stored under lock and key in a dry place. If tins show signs of rusting DO NOT keep them in your possession. Notify the nearest office of the Pesticides Control Section who will arrange with you the disposal of the tin and contents.

Toxicological Characteristics of Hydrocyanic Acid Gas

This gas is extremely toxic to humans and animals. It is soluble in water and is absorbed quite readily through the skin (this is the reason for the coveralls and rubber gloves). HCN is very fast acting. If subjected to a lethal exposure a person may take only one or two breaths before collapsing. On the other hand if the patient recovers there is usually no after effects and recovery is rapid.

Acute Poisoning

Ingesting or inhaling large amounts of HCN (10 times minimum lethal dose) produces immediate unconsciousness, convulsions and death within one to fifteen minutes. Ingesting and inhaling or absorbing through the skin an amount near the minimum lethal dose causes dizziness, rapid respiration, headache, drop in blood pressure, rapid pulse and unconsciousness.

Chronic Poisoning

Inhaling small amounts of HCN may cause dizziness, weakness, congestion of the lungs, hoarseness, conjunctivitis, loss of apetite, weight loss and mental deterioration. HCN, however, is not accumulative and if removed from all exposure the symptoms will usually clear up.

Treatment

Inhaled Cyanide

(a) First Aid

(1) Remove to uncontaminated atmosphere.

(2) Remove clothing and wash exposed skin with soap and water - keep patient warm.

(3) Call a physician.

(4) If patient is unconscious break an amyl nitrite pearl in a piece of cloth and hold lightly to the patient's nose for 15 seconds. Repeat this 5 times at about 15 second intervals.

(5) If patient stops breathing give artificial respiration until the doctor arrives and takes charge.

(b) Antidote - to be administered by a doctor

(1) As soon as possible give 10 millilitres of 3% sodium

nitrite solution intravenously at the rate of 2.5 to 5 millilitres per minute. Stop administration if systolic blood pressure goes below 80 millimetres of mercury.

(2) Follow sodium nitrite with 50 millilitres of 25% sodium thiosulphate solution intravenously at a rate of 2.5 to 5 millilitres per minute.

(3) Be prepared to repeat treatments detailed in (1) and (2) if symptoms reappear.

Suggested Dosages

There are two types of fumigation usually employed when treating greenhouses.

(1) Fumigating with ornamentals growing in the house. The normal dosage for most plants in a greenhouse is 1/4 ounce of cyanogas per 1,000 cu. ft. of greenhouse space. If tender plants such as snapdragon, sweetpea, jasminum, etc. are in the house the dosage should be cut to 1/8 ounce per 1,000 cu. ft. This may be increased subsequently to 1/4 ounce as the plants become acclimatized. If a house has a high leakage factor an adjustment upward in the amount of gas used will be necessary. DO NOT treat edible plants.

(2) When the house is free from plants, it may be desirable to give the house a good complete fumigation, prior to doing this the house should be cleared out and then treated with 1/2 to 1 pound or higher if the house is subject to leakage and red spiders are present.

When using the No. (2) method it is imperative that all precautions be observed and procedures followed.

Mushroom houses - The fumigation should take place when the top beds have been heated to peak heat (about 140°F.) and the bottom beds to about 130°F. Apply one pound cyanogas to 1,000 cubic feet of house space about 12 hours prior to the cooling of the house. This must only be done when the houses are empty or after the beds have been prepared prior to spawning. Here again it is imperative that all precautions and procedures be followed.

Points of General Consideration

(1) Cyanogas should be scattered evenly and not dumped in piles.

(2) Temperature should be kept constant or rising and above 56°F.

(3) Do not scatter cyanogas in pools of water or on muddy walks.

(4) Do not fumigate in foggy, damp, or windy days.

(5) Do not fumigate if the plants are wet.

SB
955
.O57

Fumigation procedure for
greenhouses and mushroom
[illegible]
4783